

“A Study on Industrial Training, Machining Operations, Quality Inspection and Maintenance Practices at Nikhil Industries.”

Aniruddha Vishnu Dhawale¹, Tushar Yashavant Bhutkar², Dr. Ramesh Suryabhan Gadakh³

¹ Student, Department of Mechanical Engineering Sau Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, India

² Guide, Department of Mechanical Engineering Sau Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, India

³ Principal Sau Sundarbai Manik Adsul Polytechnic, Chas, Ahilyanagar, India

Abstract

Industrial training provides engineering students with an opportunity to understand the practical application of theoretical knowledge in a real manufacturing environment. This paper presents a case study of industrial training carried out at Nikhil Industries, with particular emphasis on automobile component manufacturing, Traub machine operation, drilling, tapping, grinding, quality inspection, production practices, and machine maintenance.

During the training, various manufacturing operations were studied, including raw-material preparation, turning operations on Traub machines, drilling, tapping, grinding, component inspection, and final quality checking. Measuring instruments such as vernier calipers, micrometers and other inspection tools were studied for dimensional verification. The training also provided practical knowledge regarding machine setup, tool selection, cutting parameters, workplace safety, preventive maintenance and production quality.

Keywords: Industrial Training, Nikhil Industries, Traub Machine, Automobile Components, Drilling, Tapping, Grinding, Quality Inspection, Maintenance, Production.

1. Introduction

The manufacturing industry plays an important role in the development of the automobile and engineering sectors. Automobile components require accurate dimensions, good surface finish, high productivity and consistent quality. These requirements are achieved through appropriate machining processes, inspection methods and systematic maintenance.

Industrial training helps students understand the relationship between engineering theory and industrial practice. It provides exposure to actual machines, production methods, quality-control procedures and workplace safety.

Nikhil Industries is considered in this study as an industrial training case involving machining and automobile-component manufacturing.

Public business information lists a Nikhil Industries in Maharashtra as an automobile-parts manufacturer.

2. Objectives of Industrial Training

The major objectives of the training were:

1. To understand the overall automobile-component manufacturing process.
2. To study the working principle and operation of a Traub machine.
3. To understand drilling and tapping operations.
4. To study grinding operations and surface finishing.
5. To learn the sequence of production operations.
6. To understand quality inspection procedures.
7. To study dimensional measurement techniques.
8. To understand preventive and breakdown maintenance.
9. To develop knowledge of industrial safety practices.
10. To gain practical exposure to production-floor activities.

3. Company and Industrial Environment

The industrial environment consists of different activities such as:

- Production planning
- Raw-material handling
- Machining
- Drilling
- Tapping
- Grinding
- Quality inspection
- Tool management
- Machine maintenance
- Material handling
- Finished-component inspection

The manufacturing process requires coordination between production, quality and maintenance departments.

4. Manufacturing Process

A typical manufacturing sequence studied during the training can be represented as:

Raw Material → Cutting/Preparation → Traub Machining → Drilling → Tapping → Grinding → Inspection → Final Quality Check → Finished Component

Each operation contributes to achieving the required dimensional accuracy and surface finish.

4.1 Raw Material

The manufacturing process starts with the selection and preparation of suitable raw material according to component specifications.

Important considerations include:

- Material grade
- Diameter/size
- Length
- Surface condition
- Material certification
- Storage condition

5. Traub Machine Operation

The Traub machine is used for machining cylindrical components and producing repetitive components with controlled dimensions.

During industrial training, the following activities can be studied:

Machine setup

1. Mounting the work material.
2. Setting the required tools.
3. Checking tool alignment.
4. Adjusting tool position.
5. Setting cutting conditions.
6. Checking component dimensions after machining.

Typical operations

- Turning
- Facing
- Chamfering
- Grooving
- Threading
- Parting-off

The operator must continuously monitor tool condition, component dimensions and machine performance.

6. Drilling Operation

Drilling is performed to produce a circular hole of required diameter and depth.

Important parameters

- Drill diameter
- Spindle speed
- Feed rate
- Drilling depth
- Cutting fluid
- Tool condition

Proper drilling reduces problems such as:

- Oversized holes
- Undersized holes
- Poor surface finish
- Drill breakage
- Misalignment

7. Tapping Operation

Tapping is used to produce internal threads inside a previously drilled hole.

The major steps are:

1. Drilling the required hole.
2. Preparing the component for tapping.
3. Selecting the appropriate tap.
4. Aligning the tap.
5. Applying suitable cutting lubricant.
6. Producing the internal thread.
7. Checking thread quality.

Thread inspection is important because incorrect thread dimensions can affect assembly and functional performance.

8. Grinding Operation

Grinding is generally used to obtain better dimensional accuracy and surface finish.

The grinding operation may be performed after turning or other machining operations when closer dimensional control or improved surface quality is required.

Important factors include:

- Grinding wheel condition
- Wheel speed
- Feed
- Work speed
- Coolant
- Required surface finish

Regular dressing of the grinding wheel helps maintain grinding performance.

9. Quality Inspection

Quality inspection is an important part of automobile-component manufacturing.

The following parameters can be checked:

- Overall dimensions
- Diameter
- Length
- Hole diameter
- Thread dimensions
- Surface finish
- Chamfer dimensions
- Visual defects
- Concentricity where applicable

Measuring Instruments

Common inspection instruments include:

Instrument	Application
------------	-------------

Vernier	External and internal dimensions
---------	----------------------------------

Instrument	Application
Caliper	
Micrometer	Accurate measurement of diameter/thickness
Height Gauge	Height and layout measurement
Thread Gauge	Thread checking
Plug Gauge	Hole inspection
Ring Gauge	External diameter checking
Dial Indicator	Runout/alignment checking

10. Production Management

Production management aims to manufacture the required quantity of components while maintaining quality and controlling production time.

Important production factors include:

- Machine utilization
- Cycle time
- Tool life
- Material availability
- Operator skill
- Rejection rate
- Production target
- Machine downtime

Improvement in these factors can increase productivity and reduce manufacturing cost.

11. Maintenance Practices

Machine maintenance is essential for maintaining production continuity.

11.1 Preventive Maintenance

Preventive maintenance includes:

- Cleaning machines
- Lubrication
- Checking belts and drives
- Checking electrical connections
- Inspecting cutting tools
- Checking coolant
- Checking machine alignment
- Tightening loose components

11.2 Breakdown Maintenance

Breakdown maintenance is carried out when a machine develops a fault during operation.

Typical causes may include:

- Tool failure
- Bearing problems
- Electrical faults
- Lubrication failure
- Excessive vibration
- Mechanical wear

Proper maintenance reduces unplanned machine downtime.

12. Industrial Safety

Safety is an important component of machining operations.

During training, the following safety practices should be followed:

1. Wear safety shoes.
2. Use safety glasses during machining.
3. Avoid loose clothing near rotating machines.
4. Do not touch rotating components.
5. Use proper tools for machine adjustments.
6. Keep the workplace clean.
7. Handle cutting tools carefully.
8. Follow machine operating instructions.
9. Switch off the machine before maintenance.
10. Dispose of chips safely.

13. Observations During Industrial Training

The major observations from the training were:

- Machining accuracy depends on proper machine setup.
- Tool condition has a significant effect on component quality.
- Cutting parameters influence productivity and surface finish.
- Regular inspection helps identify dimensional deviations.
- Preventive maintenance helps reduce machine downtime.
- Operator skill is important for maintaining consistent production.
- Production and quality departments must work together.
- Proper housekeeping improves workplace safety.

14. Results and Discussion

The industrial training provided practical exposure to the complete machining cycle of automobile components.

The study demonstrated that production, quality and maintenance are interconnected. A production target cannot be achieved consistently if machines are frequently unavailable or if component rejection is high.

Similarly, quality inspection is not limited to final inspection. Dimensional checking at different stages can help identify process deviations at an early stage.

The training also demonstrated the importance of tool condition. Worn tools can cause dimensional variation and poor surface finish, potentially increasing rejection and rework.

15. Advantages of Industrial Training

Industrial training provided the following benefits:

- Practical understanding of machining.
- Knowledge of Traub machine operation.
- Understanding of drilling and tapping.
- Exposure to grinding operations.
- Knowledge of quality inspection.
- Understanding of measuring instruments.
- Awareness of preventive maintenance.
- Knowledge of industrial safety.
- Improved communication and teamwork.
- Understanding of production-floor discipline.

16. Suggestions for Improvement

Based on the training study, the following practices can support manufacturing improvement:

17. Conclusion

The industrial training at Nikhil Industries provided valuable practical exposure to automobile-component manufacturing. The training helped in understanding machining operations such as Traub machining, drilling, tapping and grinding, along with quality inspection and maintenance activities.

The study shows that achieving good manufacturing performance requires effective coordination between production, quality control, machine maintenance and skilled operators. Industrial training therefore plays an important role in developing the practical knowledge and industrial skills required by mechanical engineering students.

18. Future Scope

Future studies can focus on:

- Reduction of machining cycle time.
- Optimization of cutting parameters.
- Tool-life improvement.
- Reduction of component rejection.
- Preventive-maintenance optimization.
- Automation of inspection.
- CNC-based production improvement.
- Application of Industry 4.0 technologies.
- Production-data monitoring and analysis.

References

1. P. C. Sharma, *A Textbook of Production Engineering*, S. Chand Publishing.
2. R. K. Jain, *Production Technology*, Khanna Publishers.
3. P. N. Rao, *Manufacturing Technology*, McGraw-Hill Education.
4. S. Kalpakjian and S. R. Schmid, *Manufacturing Engineering and Technology*, Pearson.
5. Industrial training observations and practical records from Nikhil Industries.
6. Public business information regarding Nikhil Industries and its manufacturing activities.